Learning at the Nano-level: Exploring the unseen and accounting for complexity in how (and why) secondary STEM teachers learn

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Abstract

This study utilizes IUPUI's Nanotechnology Discovery Academy (INDA) for secondary Science, Technology, Engineering and Math (STEM) teachers (n=13) as its starting point for exploring issues related to teacher learning and professional development (PD). Pilot data was collected as part of an evaluation of INDA during the summer of 2013. Teacher professional learning is often represented as the measurable change (e.g. content knowledge, pedagogical content knowledge, self-efficacy, etc.) that occurs via PD "best practices." However, following constructivism, the processes of knowledge construction are complex, and what is learned — and, more importantly, how and why it is learned — is itself an assemblage of experiences oftentimes particular to the individual learner. Our preliminary findings suggest that while teacher perceptions of their pedagogical development and confidence may increase, their learning outcomes and subsequent practice take shape in relation to each individual's teaching/learning history and the political and socioeconomic reality of their school. With teacher PD remaining an important focus of U.S. educational policy, it is important to correctly characterize the emergent outcomes of PD interventions to better understand how teachers learn, what constrains their learning and practice, and how teacher professional learning can, in turn, be mobilized to empower both teachers and their students.